

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* THOMAS ECKEL,  
NICOLAUS JANKE, UWE PEUCKER, ANDREAS SWIDEL, and  
DIETER WITTMANN,  
APPELLANTS

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Appeal 2007-4316

Application 09/911,268<sup>1</sup>  
Technology Center 1700

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Decided: September 28, 2007

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Before RICHARD E. SCHAFER, TEDDY S. GRON, and MARK  
NAGUMO, *Administrative Patent Judges*.

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DECISION ON APPEAL

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<sup>1</sup> Application filed 23 July 2001. The real party in interest is listed as Bayer MaterialScience AG. (Appeal Brief filed 7 February 2005 ("Br.") at 2.)

## A. Introduction

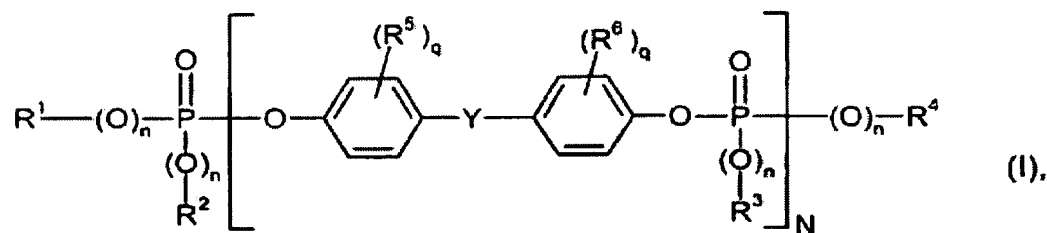
Applicants ("Eckel") appeal under 35 U.S.C. § 134 from the final rejection of claims 1–17, all of the pending claims, as unpatentable under 35 U.S.C. §§ 102(b), (e), and 103(a) in view of prior art. We have jurisdiction under 35 U.S.C. § 6(b). We REVERSE.

The subject matter on appeal relates to flame resistant polycarbonate compositions characterized by a low quantity of a particular organophosphate impurity.

Claim 1 is representative and reads as follows:

1. A polycarbonate composition comprising a phosphorus compound represented by the general formula (I),

{The figure from claim 1 is reproduced below:}<sup>2</sup>



{The Figure is said to show an oligophosphate compound}  
in which

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are each independently selected from the group consisting of (i) C<sub>1</sub> to C<sub>8</sub> alkyl optionally substituted by halogen, (ii) C<sub>5</sub> to C<sub>6</sub> cycloalkyl, (iii) C<sub>6</sub> to C<sub>10</sub> aryl and (iv) C<sub>7</sub> to C<sub>12</sub> aralkyl, each of (ii), (iii) and (iv) being optionally and independently substituted by at least one of halogen and C<sub>1</sub> to C<sub>4</sub> alkyl;

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<sup>2</sup> The text in curly braces before and after Figures and Tables in this Decision is provided to ensure compliance with section 508 of the U.S. Rehabilitation Act for publication of this Decision on the USPTO website pursuant to the Freedom of Information Act. It is not part of the Decision.

n is 0 or 1

q is 0, 1, 2, 3, or 4;

N is 0.1 to 5

R<sub>5</sub> and R<sub>6</sub> are each independently selected from the group consisting of C<sub>1</sub> to C<sub>4</sub> alkyl and halogen; and

Y denotes isopropylidene,

wherein the phosphorous compound represented by general formula (I) comprises less than 1 wt% of isopropenyl phenyl phosphate, based on the weight of said phosphorus compound represented by formula (I).

(Br. Claims App'x. at 12.)

The Examiner has maintained the following rejections<sup>3</sup>:

(1) Claims 1–17 have been rejected under 35 U.S.C. § 102(e), alternatively under § 103(a) in view of Eckel 930<sup>4</sup>. (Answer at 3.)

(2) Claims 1–17 have been rejected under 35 U.S.C. § 102(e) in view of Gaggar<sup>5</sup>.

(3) Claims 1–17 have been rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Eckel 930 and Castelnovo<sup>6</sup>.

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<sup>3</sup> Examiner's Answer mailed 18 January 2006 ("Answer").

<sup>4</sup> Thomas Eckel et al., *Flame and Stress Crack Resistant Polycarbonate Molding Compositions*, U.S. Patent 6,569,930 B1, issued to issued 27 May 2003, assigned to Bayer AG.

<sup>5</sup> Satish Kumar Gaggar and Fuh-Cheng Fred Chen (General Electric Company), *Flame Retardant Polycarbonate Blends Comprising Graft Copolymers*, EP 0 771 851 A2, published 5 July 1997.

<sup>6</sup> Lucio Castelnovo and Andrea Mattiussi, *Impact Resistant Polyesters Comprising a Crosslinked Rubbery Polymer*, U.S. Patent 3,919,353, issued 11 November 1975.

**B. Findings of Fact (FF)**

The 268 Application

1. Application 09/911,268 ("268 Application") was filed on 23 July 2001, claiming the benefit under 35 U.S.C. § 119(a) of German application 100 36 057.2, filed 25 July 2000.
2. According to the inventors, polycarbonate compositions with oligophosphates based on bisphenol A as flame retardant additives are well known but suffer from increasing deterioration of mechanical properties and yellowing under prolonged thermal stress. (268 Application at 1–2.)
3. The inventors disclosed that polycarbonate compositions comprising oligophosphate compounds that contain less than 1 wt% of isopropenylphenyl phosphate ("IPP") compared to the total phosphorus compound employed exhibit and maintain good mechanical properties and high heat resistance under prolonged thermal stress. (268 Application at 2:18–26.)
4. According to the inventors, commercially available oligophosphates based on bisphenol A contain IPP as an impurity due to breakdown during synthesis, transportation, or storage, up to about 10 wt%. (268 Application at 3:1-9.)
5. The inventors disclose that the IPP content may be kept low by maintaining relatively low reaction temperatures, short reactor residence times, and suitable catalysts. (268 Application at 21:26–31.)
6. Alternatively, the inventors state that prior to use as a flame retardant, IPP samples may be subjected to art-recognized purification and separation

processes such as chromatography or solvent extraction. (268 Application at 22:1–5.)

7. A particular example of an oligophosphate is shown in formula (V), in which  $R_1$ ,  $R_2$ ,  $R_3$  and  $R_4$  are all phenyl,  $n$  and  $q$  are 0, and  $N$ , the oligomerization index, is 1.1. (Y, isopropylidene, is  $-C(CH_3)_2-$ ). (268 Application at 27:10–19.)

8. The inventors provide in Table 2 a comparison of the physical properties of a sample of polycarbonate containing an oligophosphate having 9 wt% IPP with an otherwise identical polycarbonate containing an oligophosphate having 0.1 wt% IPP. (268 Application at 30.)

9. The properties are said to have been determined according to various standards listed in the 268 Application at 29.

10. According to Table 2, the polycarbonate sample having less IPP has a higher notched impact strength, higher heat resistance, higher flame resistance, and exhibits less yellowing upon aging. (268 Application at 30.)

#### Eckel 930

11. Eckel 930 describes flame resistant polycarbonate molding compositions. (Eckel 930 at 2:26–3:11.)

12. The Eckel 930 compositions comprise, *inter alia*, component D that is an oligophosphate comparable to the oligophosphates described in the 268 Application, but for the limitation on the amount of IPP (*Id.* at 8:1–54).

13. In particular, Eckel 930 oligophosphate D.1 is within the scope of formula (I) of the 268 Application, and is nearly the same as the oligophosphate of formula (V) used in the example of the 268 application

(the oligomerization index N is 0.85 in D.1 versus 1.1 in formula (V) of the 268 Application). (Eckel 930 at 12:15–28.)

14. Polycarbonate compositions taught by Eckel 930 comprise an additional component F, which is finely divided inorganic compounds such as  $\text{AlO}(\text{OH})$  (aluminum oxide hydroxide). (Eckel 930 at cols. 9–10.)

15. According to Eckel 930, component F "equalizes" the disadvantage of poorer flame proofing caused by the use of oligophosphate D.1. (Eckel 930 at 13:Table 1 and ll. 45–58.)

16. Eckel 930 does not describe how oligophosphate D.1 was prepared or whether it was purified.

#### Gaggar and Castelnovo

17. We do not find it necessary to describe Gaggar or Castelnovo separately.

#### The Rejections and Counterarguments

18. The Examiner finds that Eckel 930 anticipates or renders obvious the claimed subject matter because all the components are taught. (Answer at 4.)

19. In particular, the Examiner finds that phosphorus compound D.1 meets oligomer formula (I). (Answer at 4.)

20. The Examiner reasons that "[s]aid compound D.1 has a definite chemical structure and thus is [free] from [/] of other homolog or derivative. Therefore, said compound D.1 meets the instant phosphorous compound having less than 1 wt% of isopropenyl phenylphosphate." (Answer at 4.)

21. In a separate rejection, the Examiner finds that Castelnovo teaches graft polymers having a graft base with Tg less than 10°C, and concludes that the claimed subject matter would have been obvious to one of ordinary skill in the art because Eckel 930 cites Castelnovo's teachings to use such graft polymers. (Answer at 5.)

22. The Examiner also finds that Gaggar teaches compositions within the scope of the 268 Application claims, the phosphate oligomer being taught at 6:1–10, with the bisphenol-A moiety a preferred R<sup>9</sup> connecting group. (Answer at 5.)

23. The Examiner finds that "[said preferred bisphenol A as R<sup>9</sup> does not include the instantly recited isopropenylphenyl phosphate," and finds that the claimed subject matter lacks novelty over Gaggar. (Answer at 5.)

24. Applicants argue that Eckel 930 does not teach or suggest that there should be less than 1% IPP in its phosphorus compositions or the polycarbonate, and that the declaration by Dr. Eckel, the inventor, shows that commercially available phosphates corresponding to their formula (I) had more than 1% IPP. (Br. at 5.)

25. Applicants do not argue for the separate patentability of any claim on appeal.

26. The Examiner responds that Eckel 930 does not teach that compound D.1 was commercially available, in contrast to compounds D.2 and D.3. (Answer at 5–6.)

27. The Examiner points further to a commercial product, NcendX P-30, identified by Dr. Eckel, that has a low IPP content, and concludes that Dr. Eckel's declaration is entitled to little weight. (*Id.* at 6.)

28. Moreover, the Examiner points out that the Eckel declaration did not show that the Eckel 930 D.1 phosphorus compound contained less than 1 w% IPP. (*Id.*)

### C. Discussion

"A claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference." *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1374, 58 USPQ2d 1508, 1512 (Fed. Cir. 2001). "In general, a limitation or the entire invention is inherent and in the public domain if it is the 'natural result flowing from' the explicit disclosure of the prior art." *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1379 (Fed. Cir. 2003).

"[W]hen the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Our reviewing court has long accepted the practice of making rejections under § 102 or § 103 in the alternative as long as the applicant is fully apprised of the grounds of rejection. *Id.* at 708 n.2, 15 USPQ2d at 1658 n.2.

Obviousness is a legal conclusion based on underlying findings of fact. *In re Gartside*, 203 F.3d 1305, 1316, 53 USPQ2d 1769, 1778 (Fed. Cir. 2000). It follows that if a limitation of a claim is neither met nor suggested by the prior art, the conclusion of obviousness cannot stand.

Applicants have chosen to attack only the critical part of the Examiner's rejections, i.e., the Examiner's findings that the disclosures of a



particular chemical structure for an oligophosphate in the Eckel 930 and Gaggar specifications indicate that IPP is present as an impurity at less than 1 w%, as required by Applicants' claims. (Answer at 4 and 5.) Because Applicants have not made any arguments regarding the separate patentability of any of the claims, we need not address the claims separately. Moreover, arguments not made in the principal appeal brief have been waived.

37 C.F.R. § 41.37(c)(1)(vii).

The Examiner has not offered any other explanation of why it appears that Eckel 930 and Gaggar describe compositions that are the same or substantially the same as the presently claimed subject matter. In particular, the Examiner has not directed our attention to any disclosure in either Eckel 930 or in Gaggar regarding the synthesis of oligophosphates or their purification prior to use as a flame retardant. Nor has the Examiner directed our attention to any properties of the oligophosphate or the polycarbonate blends that might provide reason to presume that the prior art compositions describe or reasonably would have suggested Applicants' claimed subject matter. Thus, we conclude that the Examiner's theory of the case must be based on inherency.

Anticipation by inherency, however, is proven only if the allegedly inherent property is inevitably present in the prior art. Applicants argue (Br. at 5), that Dr. Eckel's declaration shows that commercially available bisphenol A diphenylphosphate, which is said to be the common name for the compound of formula (V) of the 268 Application, can contain as much as 15 w% IPP. (Br., Evidence App'x. at 4.) Accordingly, it is not inevitable that compound D.1 contained less than 1 w% IPP. The presence of IPP in commercially available oligophosphates within the scope of Applicants'

formula (I) is evidence that regular users of such oligophosphates either do not need to worry about the presence of IPP, or, if they do, they routinely purify the oligophosphates before use. The Examiner has not, however, directed our attention to any evidence in Eckel 930, Gaggar, or other prior art of record, that the presence of IPP was recognized to be a problem. The silence of a reference, particularly as to a substance that is apparently an impurity arising in the synthesis of a component used in the reference, is very weak evidence—to the extent that it is evidence at all—that the impurity is absent. On the present record, Applicants have come forward with sufficient evidence to outweigh the Examiner's weak support for anticipation.

Castelnuovo does not address the IPP content of phosphate fire-retardant compositions, so it cannot cure the defect of Eckel 930. Thus the Examiner's case for obviousness also must fail.

Accordingly, we REVERSE the Examiner's rejections.

In the event of further prosecution, we invite the Examiner and Applicants to consider the Table at column 13 of Eckel 930. The Table appears to show that the polycarbonate compositions that contain oligophosphate D.1, namely, composition 1 (comparative) and compositions 4 and 5, have Vicat B heat deflection values and notch impact strength  $a_k$  comparable to values obtained by Applicants (see Table 2 in the Specification at 30.) These data may suggest that IPP is present at a low level, e.g., at less than 1 w%. On the other hand, Table 2 also shows that the flame resistance (UL 94V 1.6 mm) is superior for Examples 4 and 5 and inferior for comparative example 1. The Eckel 930 inventors attribute this

superiority to the presence of the finely divided inorganic material F, which is absent from comparative example 1. According to Eckel 930, component F counteracts the deleterious effects of the organophosphate. (FF 16; Eckel 930 at 13:45–58.) Moreover, the present inventors attribute a flame resistance of V-1 to the presence of 9 w% IPP. (Specification at 3:14–16.) Thus, the flame resistance value for Comparative example 1 in Eckel 930 may support a conclusion that IPP is present at a significant level, i.e., at a level higher than 1 w%. We also recognize—as apparently did the Examiner (Answer at 6)—that Dr. Eckel did not say what the IPP content of the Eckel 930 D.1 compound was. This is a curious omission, since Dr. Eckel was the first-named inventor on the Eckel 930 patent and presumably knows or is in a position to determine the IPP content and the source of the D.1 compound. In view of these various facts that weigh for and against the level of IPP in the Eckel 930 reference, and the incomplete record, we decline to exercise our discretion under 37 C.F.R. § 41.50(b) to enter a new ground of rejection. Instead, we leave the development of these issues to the Examiner and Applicants in the first instance.

#### **D. Summary**

In view of the record and the foregoing considerations, it is:

ORDERED that the rejection of claims 1–17 under 35 U.S.C. § 102(e), alternatively under 35 U.S.C. § 103(a) over Eckel 930 is REVERSED;

FURTHER ORDERED that the rejection of claims 1–17 under 35 U.S.C. § 102(b) over Gaggar is REVERSED; and

FURTHER ORDERED that that the rejection of claims 1–17 under 35 U.S.C. § 103(a) in view of the combined teachings of Eckel 930 and Castelnuovo is REVERSED.

**REVERSED**

SCHAFER, *Administrative Patent Judge, dissenting.*

I would affirm the rejections.

Applicants have failed to show that the specific compositions relied upon by the examiner do not have less than 1% IPP. The fact that the reference is silent on the presence of IPP provides a sufficient basis to place on applicants the burden of presenting evidence that the relevant Eckels 930 compositions had 1% or more IPP .

VW

cc (via U.S. Mail)

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